

Capabilities to Support ARRA and EISA Activities: PNNL

IATF Meeting Presentation – March 18, 2009

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Core Competencies - Selected

- ▶ Carbon Management - greenhouse gas analysis/modeling
- ▶ Building Diagnostics and Controls
- ▶ Building/Installation O&M strategies
- ▶ Building/Installation project assessment (energy, water, renewable technologies)
- ▶ Technology performance evaluations/demonstrations
- ▶ High-performance sustainable building design
- ▶ Energy Efficient Lighting Strategies with focus on SSL
- ▶ Training material development and presentation
- ▶ Electricity Infrastructure Operations

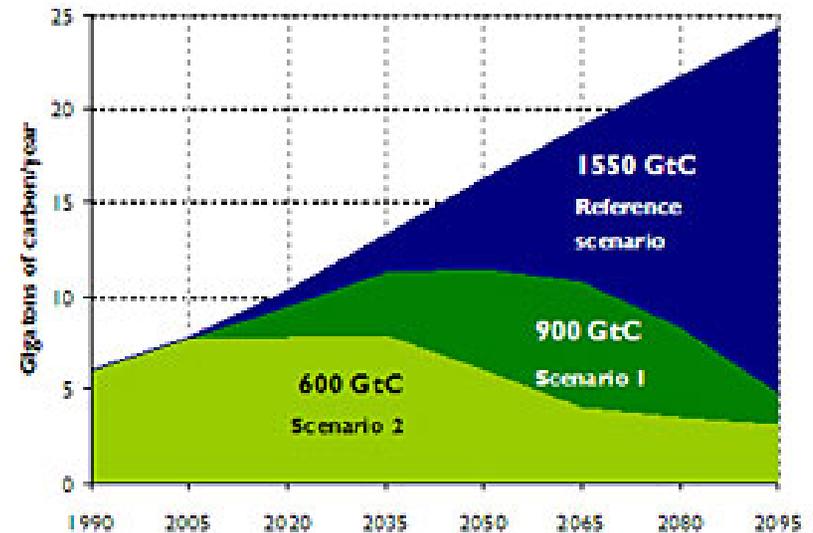


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Carbon Management

- ▶ The Joint Global Change Research Institute (JGCRI): A collaboration between PNNL and the University of Maryland. Focus areas:
 - Integrated Assessment Modeling
 - Technology Strategies to Address Climate Change
 - Natural Resource Modeling and Assessment
 - Vulnerability and Adaptation Studies
 - Local and Global Environmental Mitigation Measures--Policy Development and Testing
- ▶ GHG “footprint” developed for PNNL



New scenarios chart emissions reductions needed to meet 2095 targets.

Diagnostics and Control



Situation:

- ✓ 7 competing DDC systems with most controls failed
- ✓ High peak demand
- ✓ No load shedding
- ✓ No ability to oversee system performance

What was done:

- ✓ Standardize to 1 DDC vendor
- ✓ Upgrade worst buildings to full control
- ✓ Create load-shedding ability for buildings
- ✓ Use DSOM technology to integrate 3MW co-generation plant with DDC/buildings

Outcome:

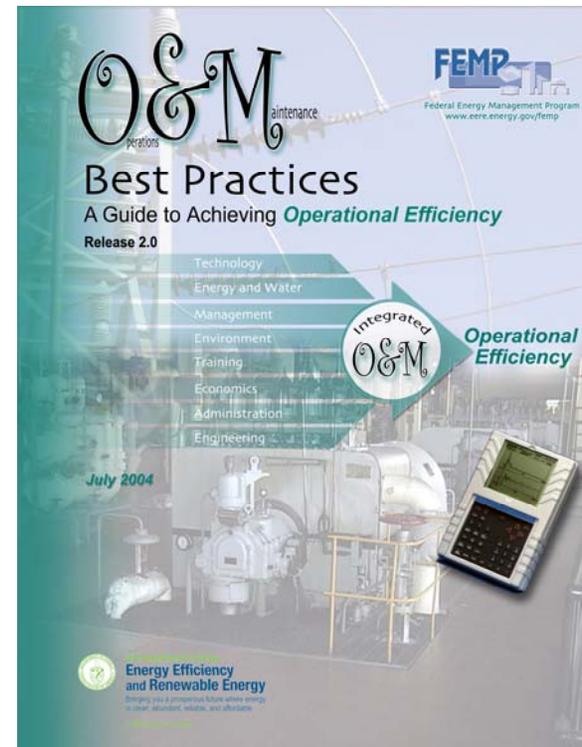
- ✓ Summer peak reduced by >10% with cost savings >35%
- ✓ Base staff fully trained to use system



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O&M Strategies

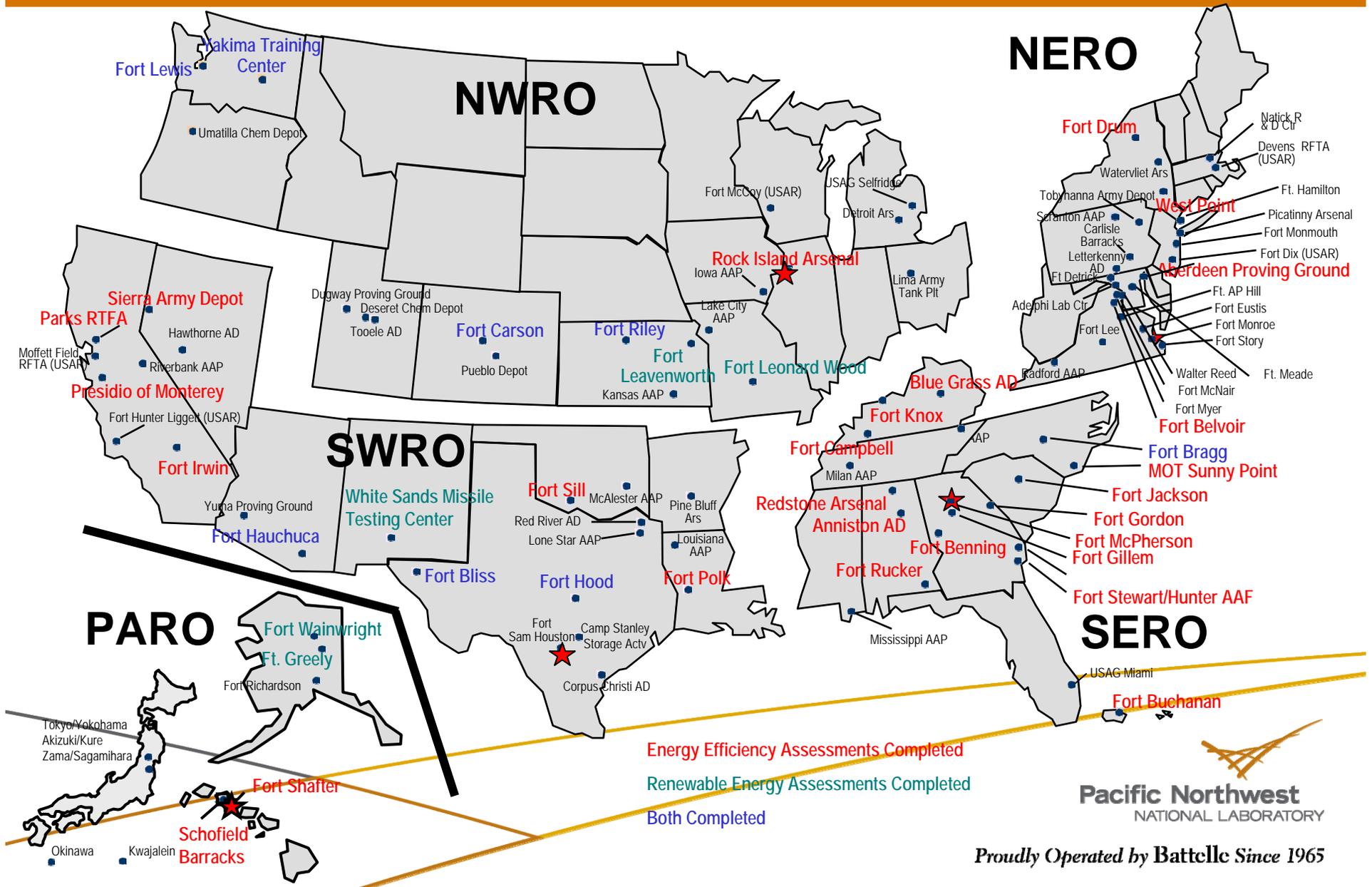
- ▶ Developed O&M Best Practice Guide
- ▶ Developed Metering Best Practice Guide
- ▶ Identified strategies at specific Federal sites as part of the ALERT, ESET, and E4 activities
- ▶ Worked with Washington State University to implement the REM concept in the Federal sector



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Energy/Renewable Assessment



Current Renewable Project Development

- ▶ Ft. Bliss Wind generation (100-200 MW)
 - Gather additional wind data in Sacramento mountains
 - Determine footprint for various capacity options
 - Conduct preliminary transmission and interconnection review
 - Develop prospectus for industry consideration
- ▶ Alaska Wind generation (Wainwright/Greely/Richardson)
 - Evaluate capacity options
- ▶ Ft. Riley Waste-to-Energy plant (30 MW)
 - Evaluate waste availability from local communities
 - Develop prospectus for industry consideration
- ▶ Ft. Benning Biomass plant (30 MW)
 - Assess proposal from utility for biomass generating plant
- ▶ Ft. Bragg Biomass and/or WTE plant
 - Assess economic feasibility of biomass/WTE plant

Technology Performance Evaluations: *USN* *Technology Validation Program*

- ▶ HVAC occupancy sensors
- ▶ Boiler combustion control
- ▶ Workstation specific intelligent lighting
- ▶ Pulse-power water treatment for cooling towers
- ▶ Parking area lighting—LED and induction
- ▶ Wall pack lighting—LED and induction
- ▶ Aerosol duct sealant

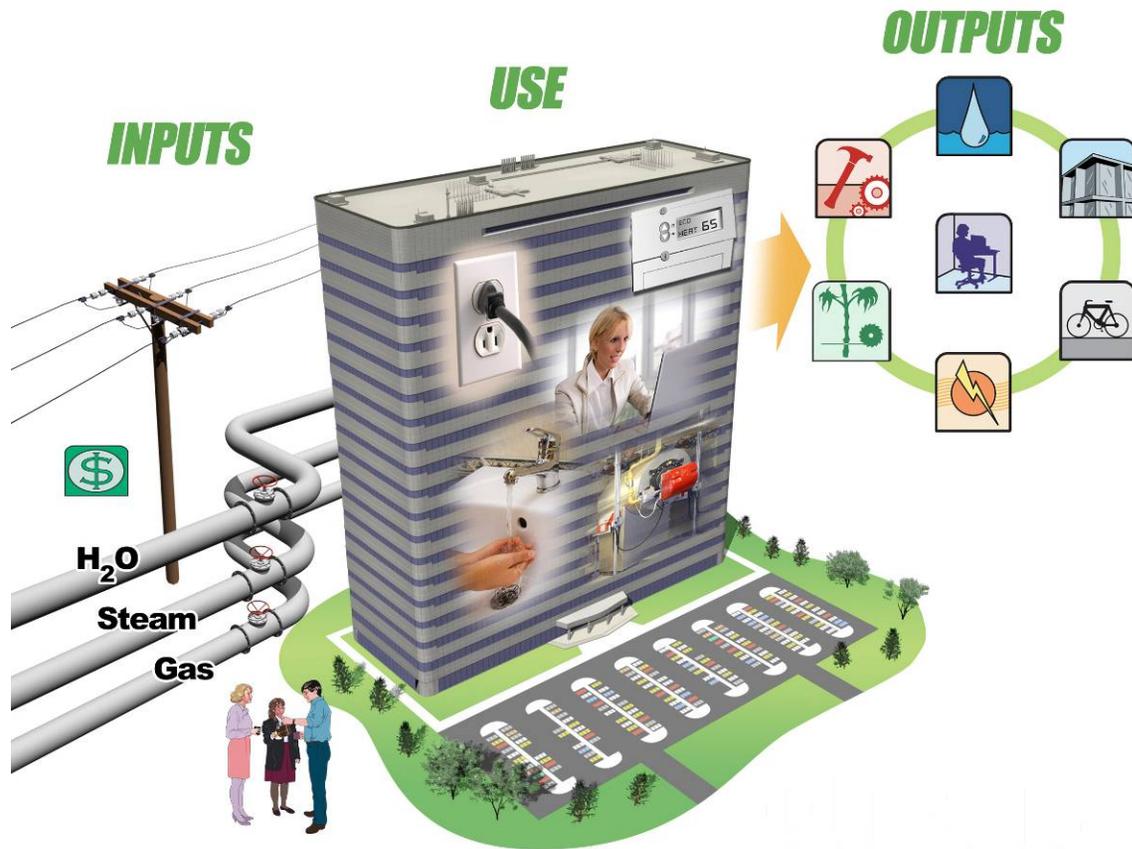


Hi-Performance Sustainable Building Design: *National Accounts Program for DOE/BTP*

- ▶ PNNL and NREL are teaming with 20+ companies to produce real-building design solutions
- ▶ Goals: **50%** energy savings in new buildings above ASHRAE Standard 90.1-2004; **30%** savings in retrofits of existing buildings
- ▶ Identify approaches **that can be replicated** within National Accounts portfolios and across nation
- ▶ Joint DOE/NAC team will strive to meet **or exceed** these challenging energy-efficiency goals while meeting business criteria



Sustainable Building Performance Measurements



	Building Characteristics
	Water
	Energy
	Maintenance & Operations
	Purchasing
	Health & Productivity
	Transportation



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Energy Efficient Lighting Strategies: *Solid State Lighting Program for DOE/BT*

- ▶ PNNL conducts SSL evaluations, demonstrations, design competitions, and standards development for DOE
- ▶ Example demos:
 - I-35W Bridge, Minneapolis, MN: roadway lighting
 - Walkway lights at FAA in NJ
 - Downlights & undercabinet lighting in Eugene, OR
 - Additional demonstrations underway (Navy & Army sites under consideration)
- ▶ Reports and Technology Briefs available: www.ssl.energy.gov/gatewaydemos.html
- ▶ PNNL also conducts **Commercial Lighting Solutions** project for DOE/BTP (packaged energy-efficient lighting solutions for commercial buildings; web-based tool for delivery)



The three-year bridge demonstration project tests LED lighting in a challenging roadway environment.

Training Development – Building Codes

- ▶ FY08 webcast topics included:
 - Exterior Lighting in COMcheck
 - Three-part series on ANSI/ASHRAE/IESNA 90.1-2007
 - Three-part series on the Advanced Energy Design Guides
- ▶ Attendees included builders, architects, engineers, code officials, and others.

FY08 webcast participants = 10,212
(35% increase compared to FY07)

FY08 webcast downloads = 15,902

AIA credit recipients = 1,068
(four times as many as FY07)

BCEP webcast participants in the last 3 years could fill Radio City Music Hall over four times!



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Electric Infrastructure Operations

PNNL is providing science, technologies and leadership to:



- ▶ Move grid control and operation timeframes from minutes to seconds
- ▶ Integrate demand response into grid/power markets for efficiency, reliability, PHEVs and carbon offsets
- ▶ Enable real-time, wide-area situational awareness for increased reliability
- ▶ Innovations to enable renewable generation integration
- ▶ Cyber secure grid networks



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